WHAT IS CLAIMED IS:

1. A process for forming a cured gradient coating film, comprising the steps of:

applying an aqueous electrodeposition coating composition comprising at least two resins and a curing agent, on an electrically conductive substrate,

heating a electrodeposition coating film to form a layer separation, and then

curing the electrodeposition coating film to form a cured gradient coating film; wherein

the resins include one resin component constituting a resin layer (a) in direct contact with air before applying top coating and the other resin component constituting a resin layer (b) in direct contact with the electrically conductive substrate, and

a solubility parameter (δa) of a resin component constituting the resin layer (a) in direct contact with air and a solubility parameter (δb) of a resin component constituting the resin layer (b) in direct contact with the electrically conductive substrate have a relationship represented by the following formula:

$0.2 < (\delta b - \delta a) < 1.0$, and

the cured gradient coating film comprises the resin layer (a) in direct contact with air, the resin layer (b) in direct contact with the electrically conductive

substrate, and a mixing resin layer (c) which is formed between the resin layer (a) and the resin layer (b) and is formed from the resin components each constituting resin layer (a) and (b).

2. The process for forming the cured gradient coating film according to Claim 1, wherein a dynamic glass transition temperature Tg(a) of the resin layer (a) is within the range of 40 to 90°C, a dynamic glass transition temperature Tg(b) of the resin layer (b) is within the range of 100 to 150°C, and a dynamic glass transition temperature Tg(c) of the resin layer (c) is within the range of 70 to 120°C.

3. The process for forming the cured gradient coating film according to Claim 1, wherein the resin component constituting the resin layer (b) contains a cation-modified epoxy resin.

4. The process for forming the cured gradient coating film according to Claim 1, wherein the resin component constituting the resin layer (a) contains a cation-modified acrylic resin.

5. The process for forming the cured gradient

coating film according to Claim 1, wherein the curing agent is a blocked polyisocyanate, and a solubility parameter (δi) of the blocked polyisocyanate, the solubility parameter (δa) and the solubility parameter (δb) have a relationship represented by the following formula:

$\delta a \leq \delta i \leq \delta b$.

6. The process for forming the cured gradient coating film according to Claim 5, wherein the one or more blocking agents is selected from the group consisting of oximes and lactams and are used in an amount of more than 60% by equivalent weight based on a total weight of the blocking agents used for blocking isocyanate.

7. The process for forming the cured gradient coating film according to Claim 1, wherein the cured gradient coating film has a solvent swelling degree of not more than 30%.

8. A process for forming a multi-layered coating film, wherein a top coating composition is applied on the cured gradient coating film obtained according to any one of claims 1 to 7, and baked.

9. The process for forming the multi-layered coating

film according to claim 8, wherein the process comprising the steps of:

preheating the electrodeposition coating film at a temperature lower than a temperature necessary for curing the electrodeposition coating film, before curing the electrodeposition coating film,

applying the top coating composition on the electrodeposition coating film with wet-on-wet, and

baking the electrodeposition coating film and top coating film simultaneously.

10. An electrically conductive substrate on which a cured gradient coating film having a solvent swelling degree of not more than 30% is applied, wherein the cured gradient coating film having a resin layer (a) in direct contact with air, a resin layer (b) in direct contact with the electrically conductive substrate, and a mixing resin layer (c) which is formed between the resin layer (a) and the resin layer (b) and is formed from the resin components each constituting resin layer (a) and (b).